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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/627,416	07/24/2003	Samantha Tan	59081-S007.US01	2811
22918	7590	03/31/2005	EXAMINER	
PERKINS COIE LLP P.O. BOX 2168 MENLO PARK, CA 94026			VINH, LAN	
			ART UNIT	PAPER NUMBER
			1765	
DATE MAILED: 03/31/2005				

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/627,416

Applicant(s)

TAN ET AL.

Examiner

Lan Vinh

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 01 March 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 28-54 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 28-46, 48-54 is/are rejected.
- 7) ☒ Claim(s) 47 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

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DETAILED ACTION

Election/Restrictions

1. Applicant's election without traverse of Group II, claim 28 in the reply filed on 3/1/2005 is acknowledged.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
 2. Ascertaining the differences between the prior art and the claims at issue.
 3. Resolving the level of ordinary skill in the pertinent art.
 4. Considering objective evidence present in the application indicating obviousness or nonobviousness.
3. Claims 28, 30, 33-34, 36-41, 43-45, 48-52 are rejected under 35 U.S.C. 103(a) as being unpatentable over Uehara et al (US 6,767,840) in view of Balconi-Lamica (US 5,516,399) and further in view of Dryer et al (US 6,187,216)

Uehara discloses a method for processing wafer in a processing bath. The method comprises the steps of:

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providing an inner tank 10 having an inner surface comprising a chemically-resistant polymer and defining an upper mouth and being receptive to the wafer 40/workpiece, wherein said inner tank is partially disposed within an outer tank 30 partially filled with an aqueous solution (col 5, lines 31-40; fig. 2)

partially filling the inner tank with an acidic etching solution (col 11, lines 6-10), which reads on partially filling the inner tank with an acidic etching solution having a total acidic of at least 10%

immersing the wafer/workpiece into the etching solution (col 5, lines 56-58)

ultrasonically agitating the etching solution with an ultrasonic transducer 31 coupled to the outer tank 30 to accelerate the etching of the wafer/workpiece (col 6, lines 12-20)

Unlike the instant claimed invention as per claims 28, 48, Uehara fails to specifically disclose filling the inner tank with at least 1 liter of an etching solution and covering the mouth of the inner tank with a lid to enclose the etching solution to increase the partial pressure above the etching solution

Balconi-Lamica discloses a method for chemical etching comprises the step of using an etching bath comprises 1.2 liter of an etching solution

Hence, one skilled in the art at the time the invention was made would have found it obvious to modify Uehara method by using an inner tank with at least 1 liter of an etching solution in order to fully immerse the wafer as taught by Balconi-Lamica (col 6, lines 7-10)

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Dryer discloses a method for etching in a wet etch bath comprises the step of covering the mouth of the inner tank with a lid to enclose/seal the etching solution, the covering lid has a cross-section substantially the same as the cross-section of the mouth of the inner tank (col 4, lines 58-60)

One skilled in the art at the time the invention was made would also have found it obvious to modify Uehara method by covering the mouth of Uehara inner tank with a lid to seal wet etch bath from the ambient as taught by Dryer (col 4, lines 59-60)

Regarding claim 30, Uehara discloses a motor 59/ a mechanism adapted to impart relative motion between the workpiece disposed in said inner tank and ultrasonic transducer (col 8, lines 19-20; fig. 1)

Regarding claim 33, Uehara discloses using a mechanism 32 /an ultrasonic buffer positioned within the aqueous solution for dampening and/or diffusing the sonic energy imparted to the etching solution (col 6, lines 14-15; fig. 2)

Regarding claim 34, Uehara discloses the ultrasonic transducer 31 is positioned outside of the aqueous solution (fig. 2)

Regarding claim 36, Uehara discloses using the circulator 21 to filter and recirculate the bath (col 5, lines 45-50)

Regarding claim 38, Uehara discloses that portion of the tank which may contact with the etching solution comprises polyethylene (col 5, lines 25-27)

Regarding claim 39, Uehara discloses using the tanks to prevent contamination of the wafers (col 8, lines 60-63) which wherein the inner tank generates less than 10 ppb of

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leachable metal contaminants and 10 ppm of leachable anionic and organic contaminants.

Regarding claims 40-41, Uehara discloses that the etching solution comprises hydrofluoric acid, nitric acid and water in a ratio of 1:1:1(col 11, lines 9-10; col 12, lines 5-10)

Regarding claim 43, Uehara discloses using a silicon wafer/workpiece (col 6, lines 7-8).

Regarding claims 44-46, Uehara discloses rotating the wafer/substrate about an axis wherein the axis is a substantially horizontal and vertical axis (col 6, lines 50-55; fig. 1)

Regarding claim 49, although Uehara differs from the claimed invention as per claim 49 by using a rectangular inner tank instead of a circular shape tank, one skilled in the art at the time the invention was made would have found it obvious to modify Uehara by using circular tanks because it is noted that "Choice in aesthetic design was held to have been obvious. In re Seid 73 USPQ 431 (CCPA 1947)

Regarding claims 50-52, fig. 2 of Uehara shows the cross-section of the rectangular inner tank 10 is substantially the same as the cross-section of the wafer 40

4. Claims 29, 42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Uehara et al (US 6,767,840) in view of Balconi-Lamica (US 5,516,399) and Dryer et al (US 6,187,216) and further in view of Leibovitz et al (US 5,221,421)

Uehara as modified by Balconi-Lamica and Dryer has been described above. Unlike the instant claimed inventions as per claims 29, 42, Uehara, Balconi-Lamica and Dryer

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fail to disclose using a heating element for regulating the temperature of the aqueous solution to 20-50⁰ C

Leibovitz discloses an etching process comprises the step of using a heating element for regulating the temperature of the aqueous solution to 30-50⁰ C (col 5, lines 6-7; col 14, lines 59-60)

Hence, one skilled in the art at the time the invention was made would have found it obvious to modify Uehara, Balconi-Lamica and Dryer by using a heating element for regulating the temperature of the aqueous solution to 30-50⁰ C as per Leibovitz because Leibovitz discloses that during etching, it is preferred that the etchant be maintained at a temperature of about 30-50⁰ C (col 5, lines 5-7)

5. Claim 31 is rejected under 35 U.S.C. 103(a) as being unpatentable over Uehara et al (US 6,767,840) in view of Balconi-Lamica (US 5,516,399) and Dryer et al (US 6,187,216) and further in view of Kaji et al (US 4,980,017)

Uehara as modified by Balconi-Lamica and Dryer has been described above. Unlike the instant claimed invention as per claim 31, Uehara, Balconi-Lamica and Dryer fail to disclose using a rod extending through the lid and coupled to the work piece

Kaji discloses a method for recirculating etching solution comprises the step of using a rod extending through the lid and coupled to the work piece (col 1, lines 63-65)

Hence, one skilled in the art at the time the invention was made would have found it obvious to modify Uehara, Balconi-Lamica and Dryer by using a rod extending through the lid and coupled to the work piece as per Kaji because Kaji discloses that it is

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conventional to support the wafer externally through a hole in a lid of an etching bath (col 1, lines 60-65)

6. Claim 32 is rejected under 35 U.S.C. 103(a) as being unpatentable over Uehara et al (US 6,767,840) in view of Balconi-Lamica (US 5,516,399) and Dryer et al (US 6,187,216) and further in view of Sheng et al (US 4,579,569)

Uehara as modified by Balconi-Lamica and Dryer has been described above. Unlike the instant claimed invention as per claim 32, Uehara, Balconi-Lamica and Dryer fail to disclose using an exhaust hood which is located above the tanks and compatible with gases produced from the aqueous solution

Sheng discloses a method for removing fumes comprises the step of using an exhaust hood which is located above the tank (col 2, lines 40-42)

Hence, one skilled in the art at the time the invention was made would have found it obvious to modify Uehara, Balconi-Lamica and Dryer by using an exhaust hood which is located above the tank to protect employee and machinery from being contaminated by harmful fumes as taught by Sheng (col 1, lines 20-24)

7. Claim 35 is rejected under 35 U.S.C. 103(a) as being unpatentable over Uehara et al (US 6,767,840) in view of Balconi-Lamica (US 5,516,399) and Dryer et al (US 6,187,216) and further in view of Meek et al (US 4,579,569)

Uehara as modified by Balconi-Lamica and Dryer has been described above. Unlike the instant claimed invention as per claim 35, Uehara, Balconi-Lamica and Dryer fail to

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disclose using a probe positioned within the etching solution for monitoring one or more of the ultrasonic energy

Meek discloses a method for control etch comprises the step of using a probe positioned within the etching solution for monitoring impurity concentration (col 3, lines 27-33)

Hence, one skilled in the art at the time the invention was made would have found it obvious to modify Uehara, Balconi-Lamica and Dryer by using a probe positioned within the etching solution for monitoring impurity concentration to control the etching strength of the etchant solution as taught by Meek (col 3, lines 20-28)

8. Claims 53-54 are rejected under 35 U.S.C. 103(a) as being unpatentable over Uehara et al (US 6,767,840) in view of Balconi-Lamica (US 5,516,399) and Dryer et al (US 6,187,216) and further in view of Lee et al (US 5,891,354)

Uehara as modified by Balconi-Lamica and Dryer has been described above. Unlike the instant claimed inventions as per claims 53-54, Uehara, Balconi-Lamica and Dryer use an acidic etching solution instead of an etching solution comprises a base such as 30 % of potassium hydroxide

Lee discloses a method of wet etching comprises the step of using an etching solution comprises a base such as 30 % of potassium hydroxide (col 4, lines 7-9)

Hence, one skilled in the art at the time the invention was made would have found it obvious to modify Uehara, Balconi-Lamica and Dryer by using an etching solution comprises a base such as 30 % of potassium hydroxide as per Lee because Lee

discloses that an etchant contains 30 % of potassium hydroxide can be used instead of an etching solution contains HF and nitric acid (col 4, lines 9-15)

Allowable Subject Matter

9. Claim 47 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims

Conclusion

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lan Vinh whose telephone number is 571 272 1471. The examiner can normally be reached on M-F 8:30-5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on 571 272 1465. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>.

LV



March 29, 2005